ALBEMARLE COUNTY FIRE RESCUE
TRAINING DIVISION

TRAINING BULLETIN

Subject/Topic: CAFS Operating Principles

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INTRODUCTION

Compressed Air Foam Systems, or CAFS, has been integrated into newer Class A apparatus specifications for all new purchases. The intent of this document is to ensure commonality in tactical application by firefighters and line officers.

IMPORTANT!

- *Fire suppression utilizing CAFS is still dependent on sufficient volumes of water to overcome BTU's generated. In no instance shall an interior attack line be placed in service while flowing less than 95 gallons per minute(gpm) of water (NFPA 1403) This standard is inclusive of attack lines utilizing a CAFS mixture for suppression purposes.*

DISCUSSION

Introduction of CAF technology into structural firefighting requiring nozzle operators and line officers to have a working knowledge of its extinguishing characteristics. In the book entitled "*3D Fire Fighting*" by Grimwood, Hartin, McDonough, and Raffel, CAF technology was researched as to best practices for application techniques. Evolutions were conducted in a 12'x8'x8' fire training unit (FTU), and results were tabulated for both plain water and CAF streams to determine the cooling characteristics of both systems.

In the chart to the right, figure 11.1 illustrates the effect of penciling techniques using a plain water stream into a compartmentalized fire. Each burst resulted in a temperature drop of 140° F per 1-second burst. In comparison, the same application utilizing a CAF stream resulted in a drop of 302° F drop, having more than twice the cooling capacity of water alone.

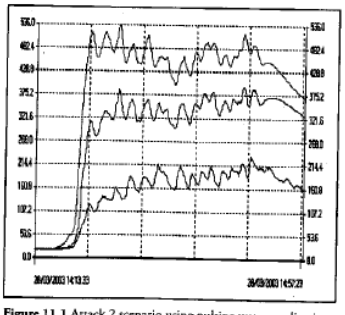

Figure 11.1 Attack 2 scenario using pulsing water applications from a ¾-inch high-pressure booster-line. *Courtesy of ADO Graham Gray, East Sussex Fire Brigade, UK*

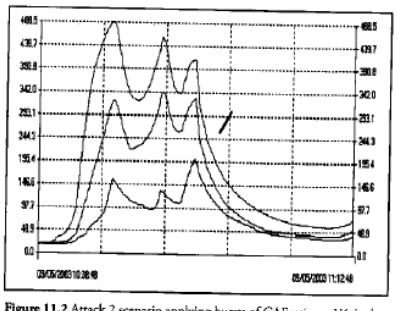

Figure 11.2 Attack 2 scenario applying bursts of CAF using a 1½-inch low-pressure attack hose-line. *Courtesy of ADO Graham Gray, East Sussex Fire Brigade, UK*

	Time (seconds)	Drop rate °F/Second
Water	222.9	3.5
Class A Foam	102.9	7.6
CAFS	38.5	20.5

Figure 1: Recorded times for temperature drop from 1000° F to 212° F.

This documented cooling characteristic of CAF technology has a direct effect on both efficiency of extinguishment and tenability of interior conditions for firefighters and occupants, providing correct application. It is recommended in the research that a CAF system requires a combination of penciling (short bursts preventing disruption of the thermal balance) in ceilings during advancement of hoselines into the fire compartment to control rollover, and an ensuing transition to a direct attack produces the most effective result when utilizing CAF for interior structural firefighting.

The authors also referred to a series of testing conducted by the Los Angeles County Fire Department, who implemented CAF interior firefighting as early as 1990. Deputy Chief Larry Miller provided the authors with the following:

Six lessons learned from the LACFD:

1. ***Interior CAF attacks should be made at the flow rate required for the structure.*** CAF saves water by knocking down the fire faster, not by knocking down the fire with a lower flow rate.
2. ***A fully charged CAF line has a very strong nozzle reaction.*** Pistol grips or other auxiliary support devices are recommended, because the high-energy stream can kick up loose objects. Eye protection should be used when working up close.
3. ***An interior attack often can be made by directing the stream through a door or window.*** This allows a greater standoff distance and reduces exposure for nozzle operators. Firefighters should aim at the ceiling for best results.
4. ***When CAF hits a fire, it generates a large volume of steam.*** Because this steam will fill the structure and vent strongly through any exterior openings, other personnel working in the vicinity should take adequate precautions.
5. ***Even though CAF reduces interior temperatures faster than water, the upper portions of a room will still be quite hot.*** Once inside, the attack team should stay low and not stand up too quickly after knockdown.
6. ***Always overhaul.*** Firefighters should use a low foam concentrate to produce a wet CAF, as high foam concentrations produce a dry foam that doesn't penetrate as well.

SUMMARY

CAFS technology, when properly implemented, has the potential to increase our suppression efficiency. Firefighters and line officers should understand the extinguishing characteristics and differing applications when implementing a CAF interior attack.